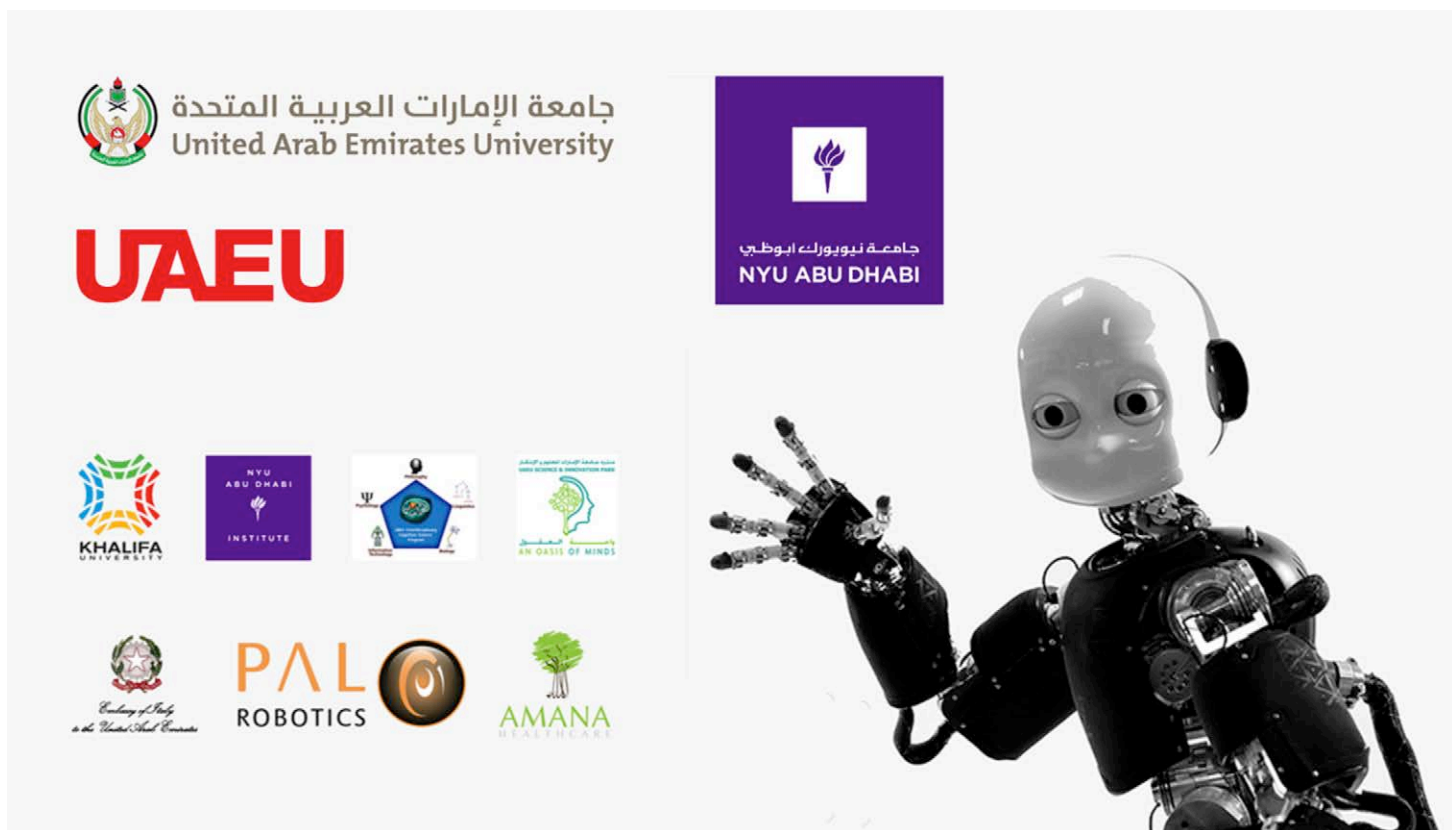


As part of Innovation Week 2015  
An event held under the patronage of  
His Excellency Sheikh Hamdan bin Mubarak Al Nahyan  
Minister of Higher Education and Scientific Research



# 1<sup>st</sup> Joint UAE Symposium on **SOCIAL ROBOTICS**

Sunday, 22 November, 2015 – Building F3, UAE University, Maqam Campus  
Monday, 23 November, 2015 – Conference Center, NYU Abu Dhabi, Saadiyat Campus

**Conference Organizing Committee UAE University:**

Abdeljelil Alwali, Massimiliano Cappuccio, Simon Langford (Philosophy Department); in collaboration with Noura Al-Mezaini (College of Humanities and Social Sciences); Boumediene Belkhouche (College of Information Technology); Mohammed Madi Ahmed (Advisor, Science & Innovation Park).

**Conference Organizing Committee NYUAD:**

Gila Bessarat-Waels, Mohamad Eid, Friederike Eyssel.

**Conference Scientific Committee:**

Massimiliano Cappuccio, Friederike Eyssel.

**Board of institutional organizers, partners, and sponsors:**

UAEU Office of the Vice-Chancellor for Research & Graduate Studies; UAEU Philosophy Department and Interdisciplinary Cog Sci Lab; UAEU College of Humanities and Social Sciences; UAEU College of Information Technology; UAEU College of Engineering; New York University Abu Dhabi - Engineering Division; New York University Abu Dhabi - Science Division; New York University Abu Dhabi Institute.

In partnership with: UAEU Science & Innovation Park; Italian Embassy to Abu Dhabi; The UAEU Center for Leadership and Public Policy; Amana Healthcare Al Ain; PAL Robotics Abu Dhabi.

**“Robotics for the Good”, Technology for the People**

In near future, robots will turn into companions to facilitate their users' everyday activities: robots will assist the elderly and people with special needs; they will take care of children and contribute to their education; they will support public safety, do their share in office environments, or serve in the entertainment and gastronomy sectors, to name but some examples. The impressive advancements in the civil applications of Artificial Intelligence (AI) and automation leave no doubt about the key role robots will play as social interaction partners. In this role, robots require flexible, robust, interactive, and social capabilities. Likewise, robotic interaction partners have to coordinate within fuzzy environments and they have to successfully complete tasks with users who are still unfamiliar with robot technology. In order to coordinate with human interaction partners, robots will need to correctly interpret their intentions, needs, and commands. Social robots have to understand user preferences and they need to communicate effectively using social conversational behaviors.

## **Technology is not Enough: the Need for Interdisciplinary Integration**

In order to master successful interaction with humans, robots have to recognize the rich specificity of the human behavioral, emotional, societal, and cultural landscape. They have to adapt to real life circumstances, preventing miscommunication, fear, repulsion, or embarrassment on the part of the user. Designing artificial systems endowed with such social and communicative skills presupposes a particular effort by the Research and Development sector, one that is not reducible to the exclusively ideational and constructive work of engineers and programmers: as in human-robot interactions the anthropological element is not less important than the artificial one, social cognition and psychology play a defining role in all stages of Research & Development, as they provide the roboticists with the theoretical and empirical bases to advance human-centered technology. Complementing the technological development with the experimental methods of social psychology and the sophisticated models of cognitive science is indispensable for two key reasons: first, this interdisciplinary integration informs the design of artificial systems with valuable insights about the social functioning of the human mind; second, it allows to empirically test the existing hypotheses about the psychological impact of robots on individuals and groups. Scholars in the area of social cognition investigate the general mechanisms that underlie interaction, understanding, and communication between intelligent agents. That is why social cognition can contribute to the work of the roboticists in multiple ways, for example offering reliable methods to measure how robots' appearance and behavior affect people, and explain or predict the typical human reactions according to accurate scientific models. Social robotics is the field in which the sophisticated models of social cognition are profitably applied to the development of autonomous artificial agents and to the study of their relationships with humans.

### **1<sup>st</sup> Joint UAE Symposium on Social Robotics: Aims and Scope**

Organized by a team of faculty at United Arab Emirates University (Al Ain) and New York University Abu Dhabi, the "1<sup>st</sup> Joint UAE Symposium on Social Robotics" discusses the latest basic and applied approaches to facilitate human-robot interaction. The conference brings together internationally renowned and leading pioneers in the domain of development of innovative solutions for assistive technologies in social and civil contexts. Thus, the event serves as a think tank to bridge the gap between research and application, between various disciplines and methodological approaches. Al Ain and Abu Dhabi host world-class researchers that work in the academia and in the industry to reflect the interdisciplinary spirit of this initiative: these scholars provide an analysis of the current and future prospects offered by social robotics to our lives, with a particular emphasis to the opportunities for fostering business and job opportunities in the contemporary Emirati society. Our purpose is to highlight the aspiration of the country in emerging as the most advanced hub for technological innovation at the service of ethical values and human development. The conference serves as a platform to reflect upon the innovative future that awaits those who live in the UAE and the neighboring GCC countries.

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DAY 1</b>       | <b>November 22, 2015 –<br/>Building F3, United Arab Emirates University (Maqam Campus, Al Ain)</b>                                                                                                                                                                                                                                                                                                                                                  |
| 9.00am-<br>12.30pm | Morning Session – chaired by Max Cappuccio (UAEU - Philosophy Department)                                                                                                                                                                                                                                                                                                                                                                           |
| 9.00am             | Registration and Coffee Break                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 10.00am            | Conference Opening and Welcome Address by:<br>- His Excellency Ali Rashid Al Noaimi, Vice Chancellor of UAE University;<br>- Ambassador of Italy in UAE, Liborio Stellino;<br>- Conference Organizers, Max Cappuccio (UAEU - Philosophy Department) and Friederike Eyssel (NYU Abu Dhabi - Psychology).                                                                                                                                             |
| 10.30am            | Keynote Talk – Giorgio Metta (Italian Institute of Technology, Genoa)<br><i>Through the Eyes of a Five-Year-Old: iCub and the Future of Robotics Research</i>                                                                                                                                                                                                                                                                                       |
| 11.30pm            | Fady Al-Najjar (RIKEN, Nagoya and UAEU - Robotics Lab)<br><i>Mirror Neurons in Humans and Robots: A Way Into the Minds of Others</i>                                                                                                                                                                                                                                                                                                                |
| 12.00pm            | Mohamad Eid (NYU Abu Dhabi - Engineering Division)<br><i>Bringing Touch to Human Computer Interaction</i>                                                                                                                                                                                                                                                                                                                                           |
| 12.30pm            | Break                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 1.30pm-<br>4.30pm  | Afternoon Session – chaired by Boumediene Belkhouche (UAEU - College of Information Technology)                                                                                                                                                                                                                                                                                                                                                     |
| 1.30pm             | Friederike Eyssel (NYU Abu Dhabi - Science Division) & Ricarda Wullenkord (Bielefeld University)<br><i>What Makes Machines Social? A Psychological Perspective</i>                                                                                                                                                                                                                                                                                  |
| 2.00pm             | Peyvand Khaleghian (Amana Healthcare, Al Ain)<br><i>Robotics and Communication Technology for People with Disabilities</i>                                                                                                                                                                                                                                                                                                                          |
| 2.30pm             | Demonstrations and Coffee Break. Featuring:<br>- UAEU Media Lab (with Jose Berengueres)<br>- Amana Healthcare, Al Ain (with Peyvand Khaleghian)<br>- PAL Robotics Abu Dhabi (with Faisal Majeed)                                                                                                                                                                                                                                                    |
| 3.30pm             | Roundtable: “Stories of Humans and Robots in UAE: the Social Sciences Factor”. Chaired by Manfred Malzahn (UAEU - English Literature Department). With:<br>- Manfred Malzahn (UAEU - Humanities and Social Sciences)<br>- Boumediene Belkhouche (UAEU - College of Information Technology)<br>- Fadwa Al-Mughairbi (UAEU - Psychology Department)<br>- Francesco Ferro (PAL Robotics, Abu Dhabi)<br>- Peyvand Khaleghian (Amana Healthcare, Al Ain) |
| 4.30pm             | Closing Remarks, Day 1                                                                                                                                                                                                                                                                                                                                                                                                                              |

| <b>DAY 2</b>   | <b>November 23, 2015 – Conference Center, New York University Abu Dhabi, (Saadiyat Campus, Abu Dhabi)</b>                                                                                             |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9.45am-10.15am | Registration and Coffee Break                                                                                                                                                                         |
| 10.15am-1.00pm | Morning Session – chaired by Friederike Eysel (NYU Abu Dhabi)                                                                                                                                         |
| 10.15am        | Welcome Address                                                                                                                                                                                       |
| 10.30am        | Keynote Talk – Verena Nitsch (Universität der Bundeswehr München)<br><i>The Social Engineering of Robot Companions. How Do We Create Likeable Robots?</i>                                             |
| 11.30pm        | Max Cappuccio (UAEU – Philosophy Department)<br><i>Beyond the Imitation Game: Ethical Decision, Situated Cognition, and the Frame Problem</i>                                                         |
| 12.00pm        | Jacob Crandall (Masdar Institute, Abu Dhabi)<br><i>Cooperating with Robots</i>                                                                                                                        |
| 12.30pm        | Jorge Dias (Khalifa University, Abu Dhabi)<br><i>Attentional Mechanisms for Socially Interactive Robots</i>                                                                                           |
| 1.00pm         | Break                                                                                                                                                                                                 |
| 2.00pm-5.20pm  | Afternoon Session – chaired by Mohamad Eid (NYU Abu Dhabi)                                                                                                                                            |
| 2.00pm         | Susanne Quadflieg (University of Bristol)<br><i>In Our Own Image? Emotional and Neural Processing Differences When Observing Human-Human versus Human- Robot Interactions</i>                         |
| 2.30pm         | Alaa El-Khatib, Naoufel Werghi & Hassan Al-Muhairi (Khalifa University, Abu Dhabi)<br><i>Cloud-Based Robots for Elderly Care</i>                                                                      |
| 3.00pm         | Keynote Talk – Takanori Shibata<br>(National Institute of Advanced Industrial Science and Technology, Nagoya)<br><i>Neurological Therapeutic Medical Robot, PARO, for Non-pharmacological Therapy</i> |
| 4.00pm         | Coffee Break                                                                                                                                                                                          |
| 4.30pm         | Plenary Discussion: “The Future of Social Robotics in the UAE and GCC” – chaired by Jorge Dias (Khalifa University, Abu Dhabi) & Mohamad Eid (NYU Abu Dhabi)                                          |
| 5.30pm         | Keynote Talk – Christoph Bartneck (The HIT Lab, University of Canterbury)<br><i>Are Robots like Humans or Humans like Robots?</i>                                                                     |
| 6.30pm         | Closing Remarks and End of the Scientific Program                                                                                                                                                     |

## LIST OF SPEAKERS AND ABSTRACTS

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### **Keynote speaker:**

#### **Christoph Bartneck (Associate Professor, University of Canterbury - The HIT Lab)**

Abstract: For centuries, we have been building ever more humanlike robots. Understanding what makes a robot human is also the key to understanding our own nature. Progress in the area of androids and artificial intelligence force us to reconsider what it means to be human. I will provide insights from science and culture to address these eternal questions.

About the speaker: Dr. Christoph Bartneck is Associate Professor and Director of postgraduate studies at The HIT Lab at the University of Canterbury, NZ. He has a background in Industrial Design and Human-Computer Interaction, and his projects and studies have been published in leading journals, newspapers, and conferences. His interests lie in the fields of Social Robotics, Design Science, and Multimedia Applications. He has worked for several international organizations including the Technology Centre of Hannover (Germany), LEGO (Denmark), Eagle River Interactive (USA), Philips Research (Netherlands), ATR (Japan), and Eindhoven University of Technology (Netherlands). Christoph is Associate Editor of the International Journal of Social Robotics, and the International Journal of Human Computer Studies.

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**Boumediene Belkhouche (Professor, United Arab Emirates University - College of Information Technology)**



About the speaker: “Since joining UAE University in August 2006 as a Professor of Software Engineering, I served as the coordinator of the Software Engineering track, Associate Dean for Academic Affairs, CIT Acting Dean, Chair of the University Faculty Affairs Committee, a member of the UAEU Strategic Planning Task Force, a member of the UAEU Workload Committee, and Associate Dean for Research and Graduate Studies. I have also led various efforts in

curriculum development and program accreditation. I teach undergraduate and graduate courses in Software Engineering, Computer Science, and Game Development. My current research covers formal specifications of autonomous robots, game-based learning, and Arabic linguistics. I received research funding from several organizations. Prior to joining the UAE University, I assumed several research positions in industry and academia (Tektronix Research Laboratories, USA; Center for Advanced Computer Studies, USA; École Polytechnique de Paris, France). I was also Professor of Electrical Engineering and Computer Science as well as the Graduate Program Director at Tulane University (USA). While at Tulane, I was highly successful in securing research grants as well as fellowships grants to support graduate students. I have been highly active with professional societies (ACM, IEEE). I was an IEEE Computer Society Distinguished Visitor.”

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**Max Cappuccio (Assistant Professor, United Arab Emirates University - Philosophy Department and Cog Sci Lab)**

Abstract: According to various theorists, including most notably philosopher Hubert Dreyfus and roboticist Rodney Brooks, artificial systems that rely exclusively on stored heuristics and internal representations of the world are irremediably destined to suffer from the so called “Frame Problem” (or, to be more precise, the metaphysical version of it): that is, the structural impossibility of deciding what information is relevant to a certain task. Recently, the philosophical discussion about the Frame Problem has been attracting new attention in the theoretical debate



on social robotics: the Frame Problem seems to be one of the main difficulties in



programming machines that are capable to take ethical decisions in sensitive circumstances that might be critical for the life of the human interactants. My paper suggests that Alan Turing, in describing his famous “Imitation Game”, was already aware of this problem. Like Dreyfus, he had already foreseen that a solution, if any exists, requires the capacity of making AIs truly embodied and environmentally situated: these are the only systems that could ever be capable to interpret the meaningfulness of their decisions against a concrete background of contextually situated and massively interconnected reasons.

About the speaker: Dr. Massimiliano (Max) Cappuccio is Assistant Professor in Philosophy of Mind and Cognitive Science at the Department of Philosophy of UAE University, where he coordinates the Interdisciplinary Program in Cognitive Science. He is also a member of UAEU Laboratory of Psycholinguistics, run in collaboration with New York University Abu Dhabi, and a founding member of the UAE Society for Robotics and Artificial Intelligence. He is a correspondent member of the Neurophilosophy Lab of the State University of Milan, Italy. He is currently working on a UAE-NRF-funded interdisciplinary project at the intersection of embodied cognition and sport psychology and is editing a special issue of *Phenomenology and the Cognitive Sciences* dedicated to “Choking Effect and Unreflective Action”.

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**Jacob Crandall (Associate Professor of Computing and Information Science, Masdar Institute, Abu Dhabi)**

### ***Cooperating with Robots***

Abstract: Since Alan Turing envisioned Artificial Intelligence (AI), a major driving force behind technical progress has been competition with human cognition. Historical milestones have been frequently associated with computers matching or outperforming humans in difficult cognitive tasks (e.g. face recognition, personality classification, driving cars, or playing video games), or defeating humans in strategic zero-sum encounters (e.g. Chess, Checkers, Jeopardy!, or Poker). In contrast, less attention has been given to developing autonomous robots that establish mutually cooperative relationships with humans even when the self-regarding preferences



of humans and robots are in conflict, but are not fully opposed. A main challenge has been that human cooperation does not require sheer computational power, but rather relies on intuition, cultural norms, emotions and signals, and pre-evolved dispositions toward cooperation, common-sense mechanisms that are



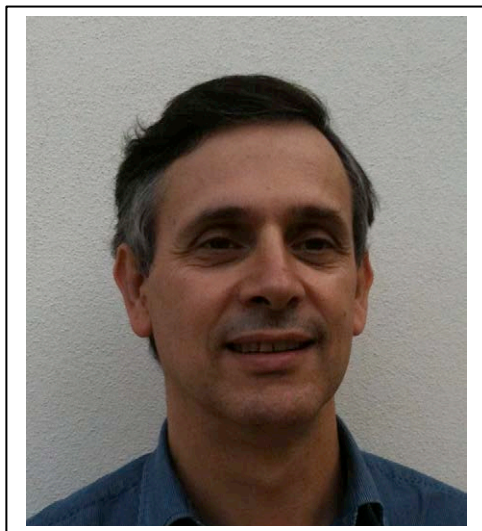
difficult to encode in machines. In this talk, we discuss a new learning algorithm we have developed that allows robots to cooperate with people and other robots at levels that rival human cooperation in two-player repeated interactions. This is the first general-purpose algorithm that is capable, given a description of a previously unseen game environment, of learning human-level cooperation within short timescales. It does so without pre-programming of well-known, game-specific strategies, thus enabling human-robot cooperation in scenarios previously unanticipated by robot designers.

About the speaker: Dr. Jacob Crandall received the B.S., M.S., and Ph.D. degrees in Computer Science from Brigham Young University, Provo, UT, in 2001, 2004, and 2006, respectively. Jacob is currently an Associate Professor in the Department of Electrical Engineering and Computer Science at the Masdar Institute of Science and Technology. Previously, he was a postdoctoral associate in the Department of Aeronautics & Astronautics at the Massachusetts Institute of Technology. His research interests include human-machine systems, robotics, multi-agent systems, machine learning, and game theory.

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**Jorge Manuel Miranda Dias (Khalifa University - Department of Electronic and Computer Engineering, Abu Dhabi)**

***Attentional Mechanisms for Socially Interactive Robots***



Abstract: In this talk, I present principles to model the attentional state by means of a Bayesian approach, which allows both self-awareness of the robot's attentional goals and inference of its interlocutor's counterpart goals. I hypothesize that, with this model, it is possible to appropriately address goal-directed modulation of perception, which in turn will allow robotic platforms to improve awareness and social acceptance. According to the theory developed by Graziano et al. to understand human consciousness and the social brain, awareness is the brain's simplified, schematic model of its own complicated,

data-handling process of attention. I propose that the same representational machinery is used by the brain to infer the attentional state and goals of the other, by processing social, body and environmental cues. I propose a Bayesian model of such a goal-directed schema integrated in a full edged artificial attention system as the necessary subsequent step, in addition to stimulus-driven attention, to design middleware for artificial cognitive systems that will allow robots to behave coherently in social human-robot interactions.

About the speaker: Dr. Jorge Dias holds a Ph.D. in Electrical Engineering from the University of Coimbra (Portugal) with specialization in Control and Instrumentation. Furthermore, Jorge Dias holds an “Agregação” (Habilitation) degree and has been Associate Professor at the University of Coimbra with activities in the Department of Electrical Engineering and Computers and the Institute of Systems and Robotics (ISR) from the University of Coimbra (UC). Jorge Dias does research in the area of Computer Vision and Robotics and has contributions on the field since 1984. He has published vastly in international journals, books, and conference proceedings. He teaches Computer Vision, Robotics, Automation, and Electrical Engineering and Computer Science and has supervised several Ph.D. and Master students in the field of Computer Vision and Robotics. Jorge Dias was been principal investigator in several international research projects. Jorge Dias coordinated the Mobile Robotics Laboratory from Instituto of Systems and Robotics and the Laboratory of Systems and Automation (LAS) (<http://las.ipn.pt>) from the Instituto Pedro Nunes (IPN) ([www.ipn.pt](http://www.ipn.pt)). Instituto Pedro Nunes (IPN) is a technology transfer institute at University of Coimbra. Jorge Dias was Vice-President of the IPN from 2008 to 2011. Since July 2011, Jorge Dias is Professor in the Department of Electronical and Computer Engineering at Khalifa University (Abu Dhabi, UAE).

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**Mohamad Eid (Assistant Professor of Practice of Electrical Engineering, New York University Abu Dhabi)**

***Bringing Touch to Human Computer Interaction***



Abstract: Haptics technology has changed the way humans interact with computers and each other via computers. Incorporating the sense of touch into human computer interaction has opened a new era of interactive applications ranging from medical simulations and rehabilitation to entertainment and social

interaction. This presentation will give an overview of the latest developments at the Applied Interactive Multimedia Research Laboratory (AIMLab) of New York University Abu Dhabi. Several projects will be introduced, such as the Haptogram system (a contact-less 3D tactile display technology), Affective Haptics system (a system to communicate emotions via touch), Haptic Learning tool (haptics for teaching Arabic language handwriting), and Haptic dental simulation for teaching periodontal procedures.

About the speaker: Dr. Mohamad Eid is the co-author of the book *Haptics Technologies: Bringing Touch to Multimedia* (Springers 2011); co-chair of the 3rd International IEEE Workshop on Multimedia Services and Technologies for E-health (MUST-EH 2013); and has been a local organizing chair for Haptic-Audio-Visual Environment and Gaming (HAVE) for the years 2007, 2008, 2009, and 2010. His current research interests include Haptics and multi-modal human computer interaction, serious gaming and tangible interfaces, and biofeedback technologies. Eid served as a teaching and research associate at the University of Ottawa from June 2008 until April 2012. He has won several awards for academic and research distinction including the Natural Sciences and Engineering Research Council of Canada (NSERC) Award of Excellence, University of Ottawa Excellence scholarship, and Ontario Graduate Scholarship (OGS) scholarship. Dr. Eid received his B.E. from Beirut Arab University; M.E. from the American University Beirut; and his Ph.D. from the University of Ottawa.

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**Friederike Eyssel (Professor of Psychology, Bielefeld University; Visiting Associate Professor of Psychology, New York University Abu Dhabi) and Ricarda Wullenkord (Researcher, Bielefeld University)**

***What Makes Machines Social? A Psychological Perspective***

Abstract: The talk emphasizes the importance of a theory-based, empirical approach to study the question as to what makes robots a social entity. To do so, I will provide an overview of the 3-Factor-Model of Anthropomorphism by Epley, Waytz and Cacioppo (2007) that proposes three key determinants that drive anthropomorphic inferences. I will summarize our latest experimental evidence on this model and highlight when we humanize non-human entities and which features and functions of a robot contribute to its perception as human-like. These findings will be discussed regarding their relevance for basic and applied research both in psychology and robotics.



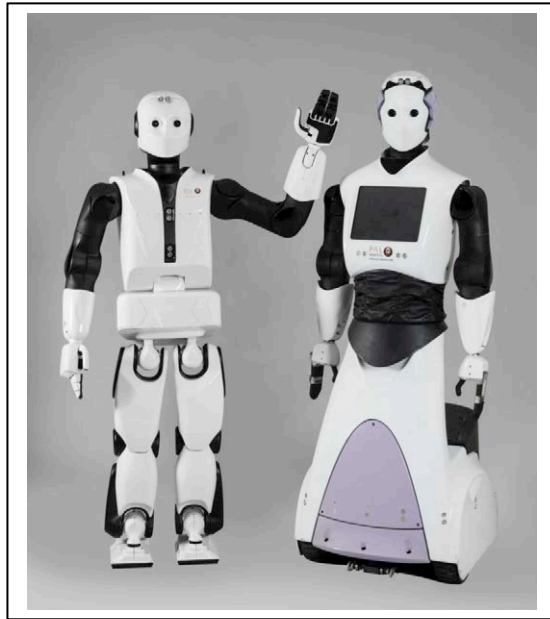
About the speakers:

Dr. Friederike Eyssel is a Visiting Associate Professor of Psychology from Bielefeld University, where she runs the Research Group "Gender and Emotion in Cognitive Interaction Technology" at the Center of Excellence in Cognitive Interaction Technology (CITEC). Dr. Eyssel has held visiting professorships in social psychology at the University of Münster, the Technical University of Dortmund, and the University of Cologne. Dr. Eyssel is interested in various research topics ranging from social robotics, social agents, and ambient intelligence to attitude change, sexual violence, dehumanization, and prejudice reduction. Crossing disciplines, Dr. Eyssel has published vastly in the field social psychology, human-robot interaction, and in the field of social robotics and serves as a reviewer for more than 20 journals. She has been involved in numerous scientific committees in the HRI community and in psychology. Current third-party funded research projects (BMBF, DFG, FP7-PEOPLE-2013-IRSES) address user experience and smart home technologies and social and ethical aspects associated with assistive technology.

Since August 2013, Ricarda Wullenkord is a PhD student in the 'Gender and Emotion in Cognitive Interaction' group and a member of the CITEC Graduate School. She received Bachelor (2010) and Master degree (2012) in Psychology at Bielefeld University. Her research interests are mainly the influence of imagined robot contact on human-robot interaction and the measurement and change of attitudes towards robots.



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**Francesco Ferro (PAL Robotics Abu Dhabi, CEO),  
Faisal Maieed Awan (PAL Robotics Abu Dhabi, Business Development  
Manager)**

About the speakers:



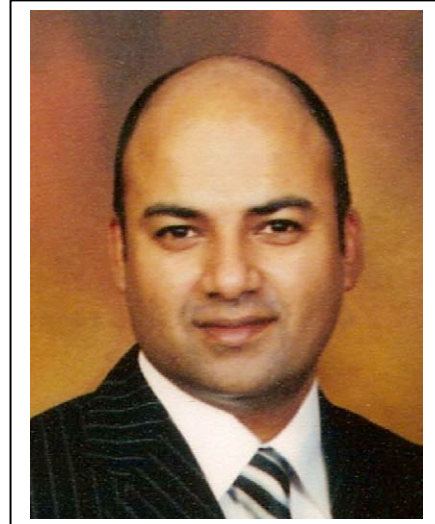
Francesco Ferro, CEO and co-founder of PAL Robotics, one of the leading service robotics companies around the world. He received his BSc and MSc degree in Telecommunications Engineering in 2002 at the Politecnico di Torino (Italy), a Master at ISEN in Lille (France) and in 2011 an Executive MBA at the University of Barcelona (Spain). Since 2004 he is working in the development of humanoid service robots in PAL Robotics.

Faisal MaJeed Awan is Business Development Manager for PAL Group of Companies.

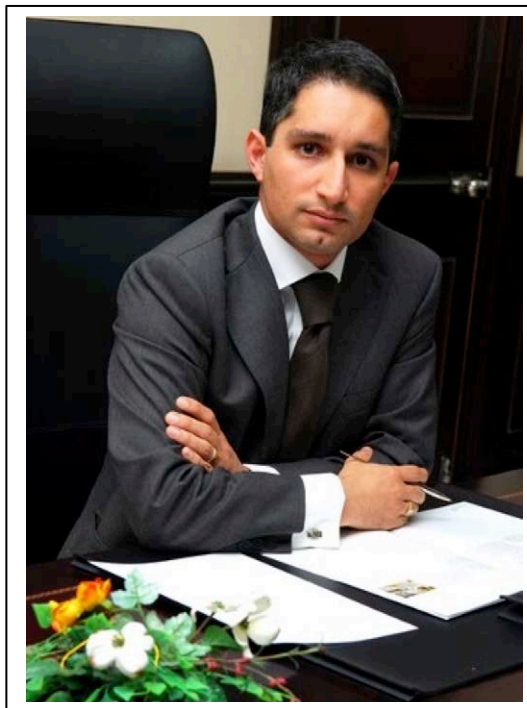
About PAL Robotics: PAL Robotics is an Abu Dhabi-based company dedicated to the research and development of humanoid robots and robotic components. It creates sophisticated service robots in order to improve the quality of people's life. The team consists of people from various countries, mostly engineers in the fields of mechanics, electronics and software, with many years of experience in



the robotics industry. The short-term goals for PAL Robotics are to introduce global best practices and solutions that help our customers to adapt and succeed in today's ever changing business environment, enhance PAL Robotics' brand recognition and image, and promote sustained growth through partnerships with leading companies. This company has developed several robots like REEM (humanoid human-size service robot with wheels), REEM-C (humanoid bi-ped human-size robot for research) and the more recent PMB2, an indoor autonomous mobile base, TIAGo Mobile Manipulator and StockBot, an autonomous inventory system solution.



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**Peyvand Khaleghian (Researcher and Practitioner, Director of Amana Healthcare, Al Ain)**

***Robotics and Communication Technology for People with Disabilities***

Abstract: What role can robotics play in transforming the lives of people with disabilities? This presentation gives a general overview of the state of robotic technology for people with disabilities and will illustrate this with concrete examples from the UAE. It will also highlight how the intersection between robotics and communication technology is opening up new horizons for people with profound disabilities, including those who require 24/7 medical

supervision due to the severity of their underlying conditions.

About the speaker: Dr. Peyvand Khaleghian is a Managing Partner at Avicenna Partners Investment Company LLC, an emerging markets-focused healthcare investment firm based in the United Arab Emirates. He is a Director of Amana Healthcare, the largest and fastest-growing provider of specialized long-term acute care, post-acute rehabilitation and home transition and respite care services in the Middle East, and the Hamdan Bin Mohammad College of Dental Medicine at Dubai Healthcare City. Dr. Khaleghian started his career as a physician but later spent eight years as a senior healthcare specialist at the

World Bank – four of them as Sector Leader in its Europe and Central Asia healthcare practice based in Almaty, Kazakhstan – with a further three years as Director of Health Policy and Strategy for the Government of Dubai. A New Zealand national, Dr. Khaleghian holds a doctorate in Health Policy and Management from the Johns Hopkins University and a medical degree from the University of Auckland, New Zealand.

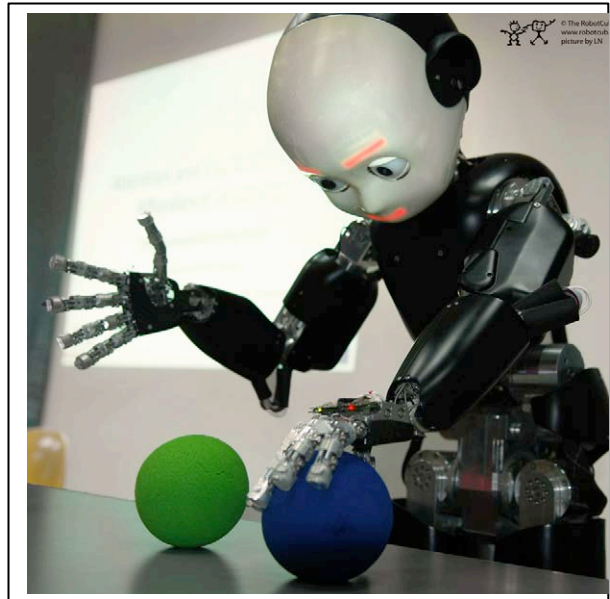
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**Keynote speaker:**

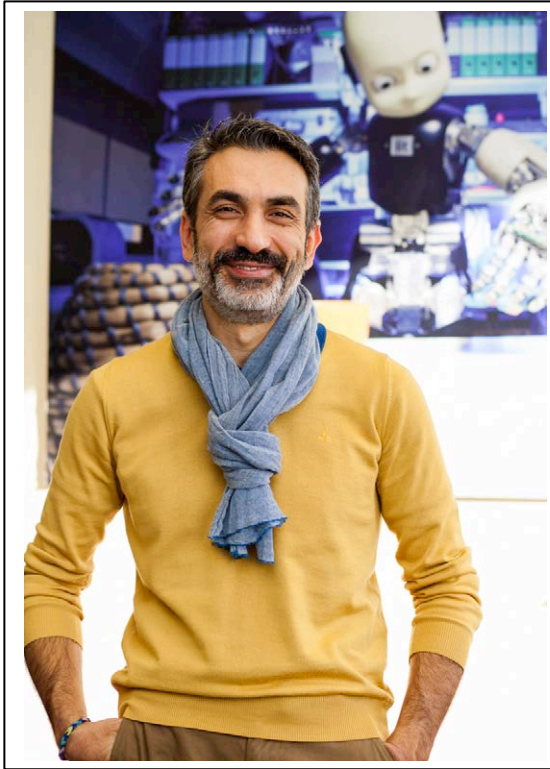
**Giorgio Metta (Professor of Cognitive Robotics, Italian Institute of Technology, Genoa)**

***Through the Eyes of a Five-Year-Old: iCub and the Future of Robotics Research***

Abstract: Since 10 years ago, the Istituto Italiano di Tecnologia (Italian Institute of Technology, IIT) has been investing in developing robotics research. It funded the development of a number of platforms shaped as humanoids, quadrupeds, plants, and devices with targeted application in surgical and rehabilitation. In the short run, robotics for surgical and rehabilitation are thought to be closest to the market. In the medium to long run, we will see the appearance of humanoids in the factory and the household. Especially for the household application cost reduction and advanced Artificial Intelligence (AI) are paramount. Our bet is that the use of new materials especially designed for robotics would give competitive advantage to the platform developers by allowing the design of affordable yet reliable - high performance - robots. On the AI side, we are simultaneously researching in computer vision, human-robot interaction, control theory, and machine learning to deliver the autonomous skills required to these robots. IIT is strengthening this research with conspicuous investments geared towards the realization of one of kind robotic platform equipped with state of the art AI skills. Along these lines, IIT is coordinating the iCub project. The iCub is a humanoid robot designed to support research in embodied AI. At 104 cm tall, the iCub has the size of a five year-old child. It can crawl on all fours, walk and sit up to manipulate objects. Its hands have been designed to support sophisticate manipulation skills. The iCub is distributed as Open Source following the GPL/LGPL licenses and can now count on a worldwide community of enthusiastic developers. The entire design is available for download from the project homepage and repository (<http://www.iCub.org>). More than 30 robots have been built so far which are available in laboratories in Europe, US, Korea and Japan. iCub is one of the few platforms in the world with a sensitive full-body skin to deal with the physical







interaction with the environment including possibly people. I will present the iCub project in its entirety showing how it is evolving towards fulfilling the dream of a robot in every home.

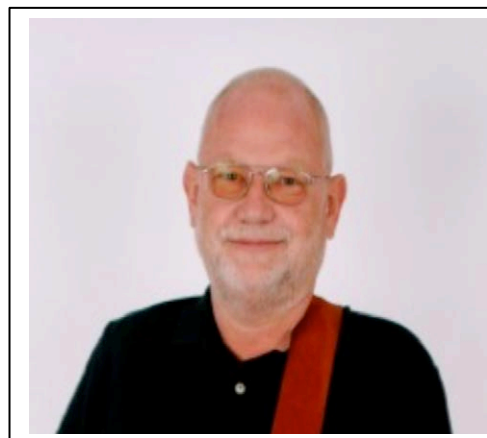
About the speaker: Giorgio Metta is director of the iCub Facility department at the Istituto Italiano di Tecnologia (IIT) where he coordinates the development of the iCub robotic platform/project. He holds a MSc cum laude (1994) and PhD (2000) in electronic engineering both from the University of Genoa. From 2001 to 2002 he was postdoctoral associate at the MIT AI-Lab. He was previously with the University of Genoa and since 2012 Professor of Cognitive Robotics at the University of Plymouth (UK). He is deputy director of IIT delegate to the

international relations and external funding. In this role, he is member of the board of directors of euRobotics aisbl, the European reference organization for robotics research. Giorgio Metta's research activities are in the fields of biologically motivated and humanoid robotics and, in particular, in developing humanoid robots that can adapt and learn from experience. Giorgio Metta is author of more than 250 scientific publications. He has been working as principal investigator and research scientist in about a dozen international as well as nationally funded projects.

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**Manfred Malzahn (United Arab Emirates University – Department of English Literature)**

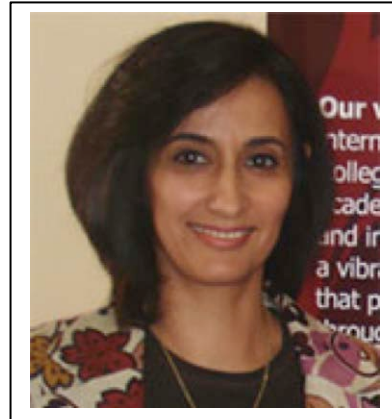
Dr. Manfred Malzahn was born in 1955 in Iserlohn, West Germany. He took up English and German Studies at the University of Bochum in 1974, and later on transferred to the University of Wuppertal, where in 1983 he completed a PhD thesis on aspects of identity in the contemporary Scottish novel. Beside a range of academic publications, Malzahn has been producing creative work in poetry and prose in both German and English since the early 1980s.



His creative writing includes song lyrics performed and recorded by various artists, as well as the libretto for a musical play premiered in Germany in 1997.

**Fadwa Al-Mughairbi (United Arab Emirates University - Department of Psychology and Counseling, Al Ain)**

About the speaker: Fadwa Al-Mughairbi is Assistant Dean for Research and Graduate Studies and former Head of the Psychology and Counseling program of the College of Humanities and Social Sciences of UAE University, where she teaches Cognitive neuroscience and Neuropsychology while conducting her experimental studies on the behavioral effects of brain cells degeneration. She runs a research project on Parkinson Disease with UAEU Medical School, and collaborates with the researchers of Panjwani Center of Molecular Medicine, Karachi University, Pakistan.



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**Alaa El-Khatib, Naoufel Werghi, and Hassan Al-Muhairi (researchers at Khalifa University, Abu Dhabi)**

***Cloud-Based Robots for Elderly Care***

Abstract: With projections predicting a rise of elderly populations to as high as 40% of total population in certain parts of the world within the next four decades, many government and academic institutions have started researching and developing policies, mechanisms, and systems that will allow nations to deal with the economical and societal challenges that will accompany such a demographic trajectory. One of these challenges is elderly care: Who will provide care to such a large dependent part of a population? If they were all to be admitted to hospitals and elderly care centers, how can the healthcare infrastructure in its current state cope with such a challenge, physically and economically? And who will provide the needed workforce of nurses and caregivers? Struggling with such dilemmas, policymakers and researchers are turning to smart homes and assistive robots for possible solutions, with the aim of utilizing them to bring about the conditions necessary to allow elderly people to continue on living independently and safely in their homes for as long as possible, thus reducing the burden on healthcare institutions. Moreover, recently, researchers in robotics have started exploring cloud-based systems, where possibly multiple robots can share information, collaborate on tasks, and offload computationally taxing programs. To a degree, this allows the separation of the robotic systems from the storage and computational hardware, which reduces the energy needs of the robots, resulting in cost, size, and weight reductions. Moreover, robots with limited intelligence capabilities can use the cloud in order to acquire new capabilities in the form of robotic software components that extend their existing skill set to match their physical capabilities. Our work falls within this context, researching the use of cloud-based robots to address similar challenges related to elderly care in the UAE, where the elderly population is expected to rise to around 25% of the entire

population by the year 2050. Specifically, we present a prototype robotic system that can provide some of the required functionalities of an assistive robot deployed around elderly population, such as: human detection; identification using 3D face recognition; person tracking and following; and fall or behavioral anomaly detection. The system uses a cloud-based architecture, with a central server that allows remote computations and information sharing between: multiple local robots (same site), a remote robot (different site), and other parts of the automated home system (e.g., cameras, lights). While performing human tracking and following in unconstrained environments, such as those where elderly care robots could operate, there are no guarantees that the robot will always have access to direct face information (from a camera's field of view). To address this issue, we present a technique whereby the robot keeps track of the faces, and dress colors of the people it recognizes during an interaction session, and fuses this information, when appropriate, to identify people with occluded faces. We envision that additional modalities can be incorporated in the future to attain more robust detection and recognition.

About the speakers: all researchers are affiliated with the Visual Signal Analysis & Processing (VSAP) Research Centre at Khalifa University.

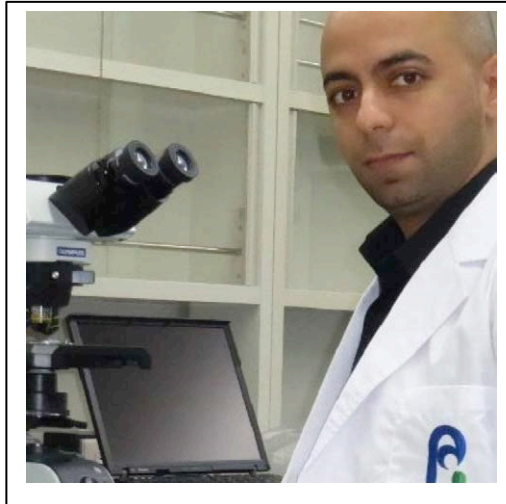
Alaa El-Khatib is a Research Assistant at Khalifa University working on developing and implementing Social Robots for Informal Elderly Care. His expertise include image processing, computer vision, artificial intelligence and Robotic programming, and development.



Dr. Naoufel Werghi is Associate Professor at the ECE Department at Khalifa University. His main area of research is image analysis and interpretation. He has led several grant projects in the areas of biometrics, data analysis, medical imaging, geometrical reverse engineering, and intelligent systems. He is a regular reviewer for several journals, including Computer-Aided Design, IEEE potential, Pattern recognition letters, and Optical Engineering. He has been a committee member in many international conferences. He published more than 70 journal and conference papers.

Dr. Hassan Al-Muhairi is the Director of Graduate Studies and an Assistant professor at Khalifa University. His research interest spans the area of computer vision and image processing while also including high-level image understanding using Artificial Intelligence algorithms. His most recent work focus on the development of social robotics for natural integration with humans and informal care and monitoring. He is also an expert member in UAE Ministry of Education team for new K-12 grades Computer Science curriculum.





**Fady Al-Najjar (Research Scientist, RIKEN, Nagoya; Assistant Professor, United Arab Emirates University - Robotics Lab, Al Ain)**

***Mirror Neurons in Humans and Robots: A Way Into the Minds of the Others***

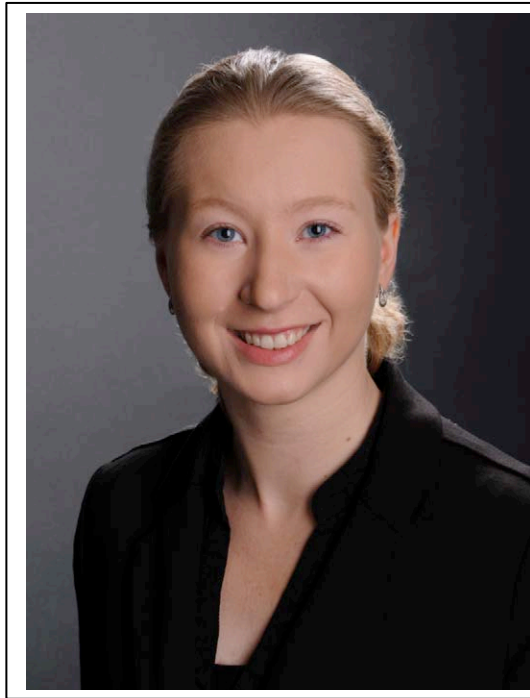
Abstract: Have you ever wondered why we emotionally involved when we are watching horror or sad movies? Why we smile or feel happy when we see a person smiling or laughing? Why we feel pain when watching someone else get injured?

A special type of brain cells called “mirror neurons” is the basis behind these phenomena. The mirror neurons fire not only when we act but also when we observe the same action performed by another person. These neurons simply “mirror in us” the behavior/emotion of the others, thus give us the capacity for learning new skills by imitation. Mirror neurons work by training to predict other people actions and feeling through the continuous interpreting the sensory implications of the perceived sequence of motor actions. Unlike sensorimotor neurons which are trainable by our interactions with the surrounding environments, mirror neurons can only be trained when we communicate with others, therefore they could be considered the basis of the composition of social life among human beings. Lesions of those neurons can be associated to autism. Understanding the mechanisms behind mirror neurons is the key towards accessing “Social Robotics world”, which are essential for wide robotics applications such as *Rehabilitation Robotics, Partner Cars*, etc. In my talk I will present preliminary experiments on the imitative interactions between a humanoid robot and a user. An artificial neural network model represents, in abstract, how our mirror system can be implemented in a robot to learn various movement patterns directly from a user and regenerate each pattern synchronously with the user assistance.

About the speaker: Fady S. Al-Najjar is a research scientist at the Intelligent Behavior Control Unit, BSI, RIKEN. He received a M.S. degree from the Department of Human and Artificial Intelligence System at the University Of Fukui, Japan (2007), and a Dr. Eng. degree in System Design Engineering from the same university in 2010. Over the past 3 years, he was interested in brain modeling in aim to understand higher-order cognitive mechanisms. Recently, he started to study motor learning and adaptation from the sensory and muscle synergies perspective in order to suggest practical applications for neural-rehabilitations.

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**Keynote speaker:**

**Verena Nitsch (Assistant Professor,  
Universität der Bundeswehr  
München)**

***The Social Engineering of Robot  
Companions. How Do We Create  
Likeable Robots?***

Abstract: Robots that cook creatively, clean up our rooms dutifully, teach our children patiently, entertain our guests wittily and keep us company loyally. Robot companions are envisioned by researchers around the world and may become ubiquitous in the future. Aside from the numerous technical challenges, which must be overcome before this vision can become a reality,

multi-disciplinary research is also required for the social engineering of robots. In order to create robots that we accept, trust and welcome into our homes, it is paramount that we identify and investigate the factors that affect social interactions between humans and robots. How should robots look, behave and communicate with us? Should robots express emotions and deliberately appeal to our emotions? What are our expectations of robot behavior in a social context? Do we expect humanoid robots to act like humans or machines? The talk will address these questions and present recent research on the social engineering of likeable robots.

About the speaker: Dr. Verena Nitsch received B.Sc. and M.Sc. degrees in Applied Psychology in the UK, after which she pursued an academic career at the Human Factors Institute of the Bundeswehr University Munich in Germany, where she received a doctoral degree in Engineering in 2012 and was appointed Assistant Professor in Cognitive Ergonomics in 2013. For her research work, she has received several national and international awards. She is a member of numerous professional bodies, including the IEEE, the International Association of Applied Psychology, and the German Usability Professionals Association.

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**Susanne Quadflieg (Lecturer,  
University of Bristol)**

***In Our Own Image? Emotional and  
Neural Processing Differences When  
Observing Human-Human versus  
Human-Robot Interactions***

Abstract: Robotics engineers generally expect that humans will be more comfortable around robots, the more human-like their appearance. Initial psychological research indicates, however, that increases in outer human-likeness can trigger enhanced discomfort towards robots, due to inviting anthropomorphic mind attributions. In this talk, I will try to reconcile both claims by arguing that not mind attributions per se, but rather failing to understand the purpose of seemingly human-like minds in humanoid robots, can predict discomfort towards them. Adopting a social neuroscience approach, I will further demonstrate that interpreting social actions in robots relies on different mentalizing strategies than interpreting the same actions in humans. By highlighting pivotal sub-routes of impression formation based on agent type this talk will identify prominent challenges in the design of humanoid robots.



About the speaker: Susanne Quadflieg's work combines modern neuroimaging techniques (e.g., fMRI) with traditional behavioral and self-report measures to address questions of social perception and social reasoning. After she was trained in psychology at the University of Jena (Germany), the University of Aberdeen (Scotland), and the University of Louvain-La-Neuve (Belgium), Susanne held her first faculty position at New York University Abu Dhabi (United Arab Emirates). Since January 2015, Susanne has been a Lecturer for the School of Experimental Psychology at the University of Bristol (England).

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**Keynote speaker:**

**Takanori Shibata**

**(Chief Senior Research Scientist, Human Informatics Research Institute - National Institute of Advanced Industrial Science and Technology, Nagoya; Visiting Professor, Tokyo Institute of Technology; Visiting Fellow, AgeLab - Massachusetts Institute of Technology)**

***Neurological Therapeutic Medical Robot, PARO, for Non-pharmacological Therapy***

Abstract: Robot therapy, which uses robots as a substitution for animals in “animal therapy,” is a new robot application in the fields of welfare and patient care. The baby seal robot “PARO” began development for robot therapy in 1993. PARO was commercialized in Japan in 2005, and in Europe and the U.S. in 2009, and about 3,500 PAROs have been used in hospitals and care facilities in more than 30 countries. Recent clinical trials including randomized controlled trials have revealed that robot therapy has a similar effect on patients as animal therapy. In 2009, the U.S. Food and Drug Administration (FDA) certified PARO as a “neurological therapeutic medical device.” PARO can be used in various kinds of therapy similar to real animals, such as palliative care for cancer patients and training of social skill of children with developmental problems. There are a lot of evidences of therapeutic effect of PARO on elderly dementia patients because explicit differences can be easily observed before and after interacting with PARO. The therapeutic effects of the elderly with dementia interacting with PARO include improvement of depression, anxiety, loneliness, pain, agitation, and quality of life, and recovery from speech disorders. PARO can reduce usage of psychotropic medications as a non-pharmacological approach. PARO can also reduce burden of care and nursing, and social cost of medical and welfare service.

About the speaker: Dr. Takanori Shibata was born in 1967 and received B.S., M.S. and Ph.D. in Electronic and Mechanical Engineering from Nagoya University in 1989, 1991, and 1992, respectively. He was a research scientist at AIST from 93 to 98. Concurrently, he was a visiting research scientist at the Artificial Intelligence Lab., Massachusetts Institute of Technology from 95 to 98, and a visiting research scientist at the Artificial Intelligence Lab., Univ. of Zurich in 96. At the AIST, Dr. Shibata was a senior research scientist from 98 to 13. Concurrently, he was the Deputy Director for Information and Communication Technology Policy, Bureau of Science, Technology, and Innovation Policy, Cabinet Office, Government of Japan from 09 to 10. Since 2013, he has been the current



positions. His research interests include human-robot interaction, robot therapy, and humanitarian de-mining. He was certified as the inventor of a seal robot named PARO, the World's Most Therapeutic Robot, by Guinness World Records in 2002. He has received many awards including the Robot of the Year by Ministry of Economy, Trade and Industry, Japan in 2006, The Outstanding Young Person (TOYP) of the world by Junior Chamber International (JCI) in 2004, and the Japanese Prime Minister's Award in 2003.

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